The effect of substitution of zinc with aluminium in the brucite-like layers on the physicochemical properties of zinc-aluminium-layered double hydroxide-pamoate nanocomposite.

ABSTRACT

Layered organic-inorganic hybrid materials of Zn-Al-layered double hydroxide (LDH)-pamoate nanocomposite (ZAPR) were prepared using various initial Zn/Al molar ratios (Ri) from 8:1 to 2:1 which gave initial values of A 3+/(Zn 2+ + Al 3+) mole fractions, (x i) from 0.11 to 0.33. The Al 3+ mole fractions in the resulting nanocomposite material (x f) were greater than x i and the difference between x i and x f was found to be a constant value of 0.03. The increase in the x f values will increase the Al 3+ content in the interlayer spaces of layered double hydroxide and therefore increases the charge density of the inorganic brucite-like layers and give stronger electrostatic attraction between the excess positive charge of Al 3+ and the negative charge of the interlayer pamoate anion and hence decreases the d value of the material. However, the BET surface area of the resulting materials will decreases when the x f is increased. This shows that the mole fraction of Zn 2+ replaced by Al 3+ in the inorganic brucite-like layer plays an important role in controlling the physicochemical properties of the resulting material, which is particularly useful in determining tailor-made property required in the designed material.

Keyword: Physicochemical properties; Zinc-aluminium-layered double hydroxide; Pamoate; Nanocomposite.